



Sevenoaks Wildlife Reserve

Bat Presence/Likely Absence Survey Report



KWT Consultancy Services



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This report has been prepared in accordance with British Standard 42020:2013 “Biodiversity, Code of practice for planning and development”.

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1 SUMMARY

Kent Wildlife Trust is seeking to obtain planning permission for improvements to the existing visitor experience at its Sevenoaks Wildlife Reserve. The land subject to development proposals comprises a c.1.75ha area located in the south-west of Sevenoaks Wildlife Reserve and Site of Special Scientific Interest (SSSI), on the northern periphery of Sevenoaks town in Kent.

The proposals include the following:

- Demolition of four structures (B1, B2, B4 and B5) and several containers to facilitate new access and car and coach parking areas
- Renovation of building B3
- Removal of a low number of trees in the vicinity of B8 and the enlarged parking areas and one way road system
- Extension and renovation of the existing visitor centre building (B8) – including recladding and insulation for improved thermal performance, requiring the temporary removal of all roof tiles and timber weatherboarding from all elevations
- Installation of air sourced heat pumps within the visitor centre and photo voltaic panels on the visitor centre roof
- Resurfacing of all access routes and parking areas
- New play area to east of visitor centre
- New areas of tree planting and soft-landscaping in the north, east and west of the site.

KWT Consultancy Services (KWT CS) was commissioned to undertake bat presence/likely absence surveys of five structures with suitable features for roosting bats which will be directly or indirectly impacted by the proposals (B2, B3, B5, B6 and B8) and a mature oak tree (T27).

Kent and Medway Biological Records Centre (KMBRC) was contacted and asked to provide a standard data search report for the survey area and its environs, which included bat records from Kent Bat Group for the surrounding 5km and a map of known bat roosts within 1km.

Surveys were undertaken during the spring/summer of 2020 and winter of 2020/21, and included dusk/dawn surveys, endoscope inspections and static monitoring during the hibernation season. Droppings collected within roosts during the preliminary roost assessment (KWT CS, April 2020) were subject to mitochondrial DNA analysis and the results are provided herein.

The surveys identified a total of eight roosts, characterised in the table below:

Building No.	Roost No.	Roost Characterisation	Species	Conservation significance
B3	1	Transition Day roost	Nathusius'pipistrelle	Moderate
B6	2	Day	Common pipistrelle	Low
	3	Day	Soprano pipistrelle	Low
	3a	Day/night/ feeding	Brown long eared – unconfirmed droppings	Low
B8	4	Day	Soprano pipistrelle	Low
	5	Day	Soprano pipistrelle	Low
	6	Day	Soprano pipistrelle	Low
B8	7	Hibernation (2019)	Daubenton's	Low-Moderate
B8	8	Hibernation (2021)	Pipistrelle sp.	Low-Moderate

Tree surveys

Fifteen trees within the survey area were identified to have suitable features for roosting bats during the PGLRA (KWT CS, April 2020). Of the 15, four were assessed to be of negligible suitability, nine were of low suitability and two were of moderate suitability (Figure 4). One of the nine low suitability trees, a mature decaying oak T184, is to be removed as part of the proposals and will require soft-felling under licensed supervision. The other trees that are to be removed – outlined in red on Figure 2 – do not support suitable features for roosting bats. Artificial lighting will be provided within the parking areas - measures to avoid potential impacts on retained trees with suitable features are detailed in Chapter 7.3.

Assessment of bat foraging habitat

The habitats within the survey area are of moderate suitability for foraging and commuting bats, comprising broadleaved woodland edge, dense scrub, mature hawthorn hedgerow, scattered trees and areas of short-sward semi-improved grassland which are well connected to the wider reserve to the north, east and west, and to grazed fields and allotments to the south.

Of the eight species known to occur within a 1km radius of the survey area, seven were confirmed during the presence/likely absence surveys. In addition, Leisler was recorded on several occasions. The proposals include limited removal of native and non-native scrub and trees, with very little impact on the tree corridors that are present within the north, west and south. It is considered that the works will not result in a significant loss of foraging habitat for the species recorded. A Sensitive Lighting Plan has been recommended to protect foraging and commuting areas within the survey area and adjacent habitats.

Constraints and Recommendations

The tables below show a summary of the Outline Mitigation Strategy for the site based on the survey results.

Roost No.	EPS Licence required	Requirement for Licensed Supervision during works	Works Timing	Compensation	Additional mitigation	Monitoring
1	Y	<ul style="list-style-type: none"> Pre-works endoscope check of features Fitting of one-way exclusion device Repeat endoscope check Supervision of timbers removal prior to renovation works 	June – October (if no maternity roost found during first endoscope check)	Re-instatement of roost feature on completion of works	Sensitive Lighting Plan – all roosts and foraging / commuting habitat	All roosts
2	N	n/a	n/a	n/a		
3	N	n/a	n/a	n/a		
3a	N	n/a	n/a	n/a		
4 – 8	Y	<ul style="list-style-type: none"> Pre-works endoscope check Removal of bat boxes Supervision of all timber cladding removal on southern and western elevations Tool box talk pre- 	May – October (if no maternity roost found during endoscope check of boxes)	<ul style="list-style-type: none"> Reinstallation of bat boxes post-works Provision of additional boxes pre- and post-works 		

		roof tile removal				
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Tree No.	Suitability for roosting bats	Impact	Recommendation
T184	Low	Removal of tree	Soft-fell under licensed supervision

Survey Data Validity

When assessing EPS licence applications, Natural England usually requires survey data from the most recent survey season.

For buildings where no bat roosts are discovered, the validity period of the survey data will range from 12-18 months depending on the extent of suitable features within the structure and the proposed works timings.

Figure 1: Survey Area – Map of Structures

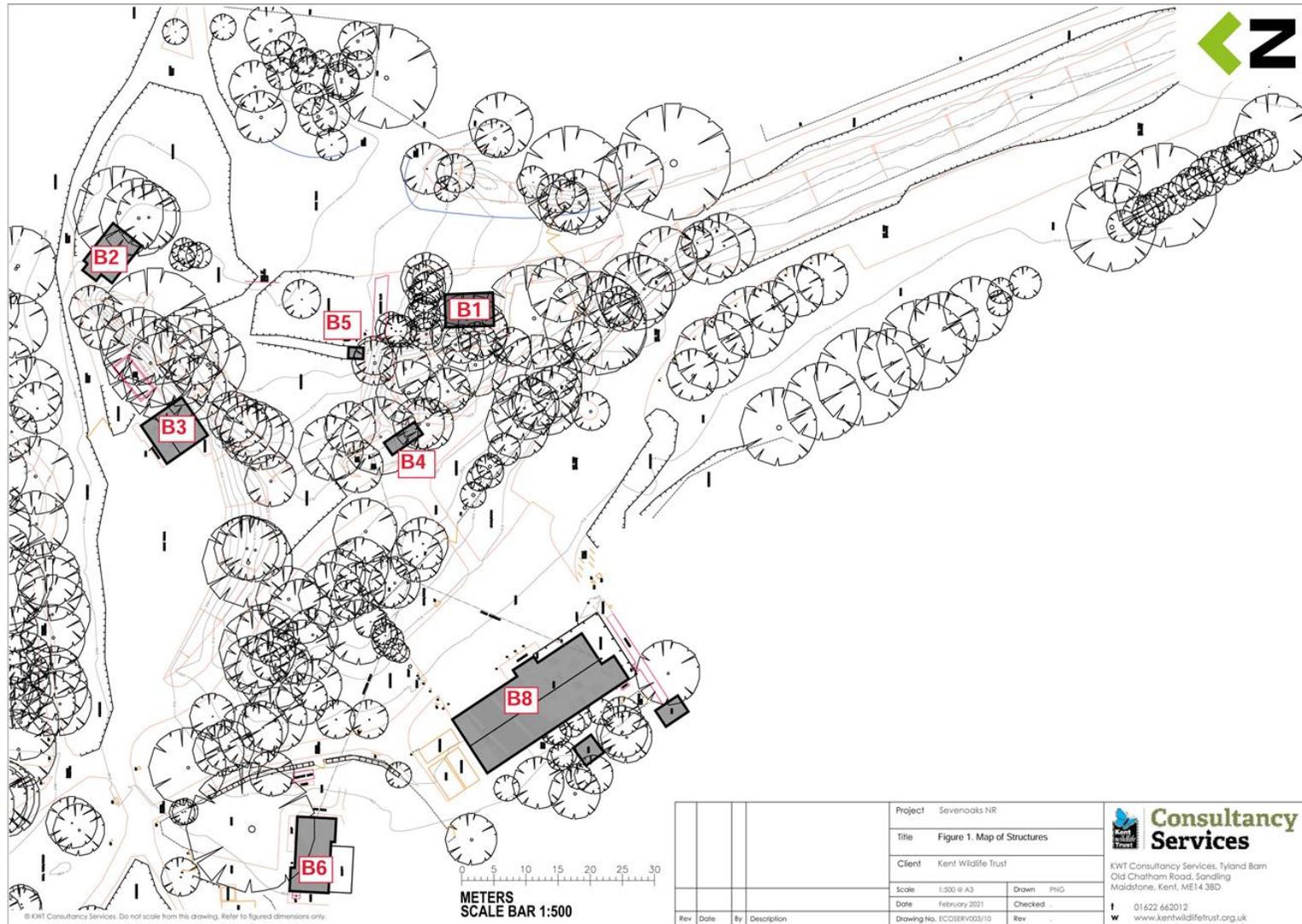


Figure 1: Development proposals



Figure 2: Surveyor locations for the summer presence/likely absence surveys of buildings B2, B3, B5, B6 & B8. Surveyor locations are shown in blue

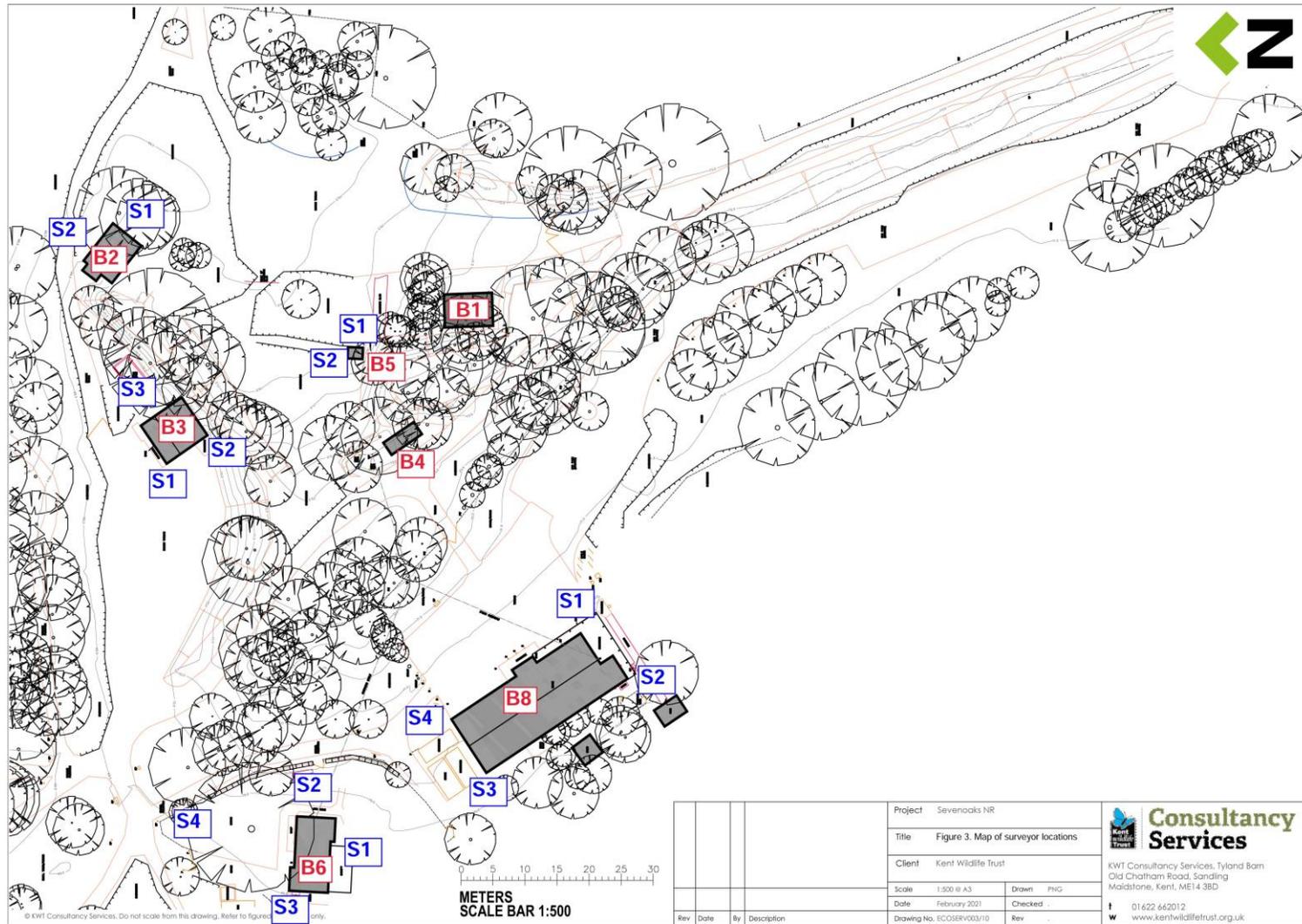
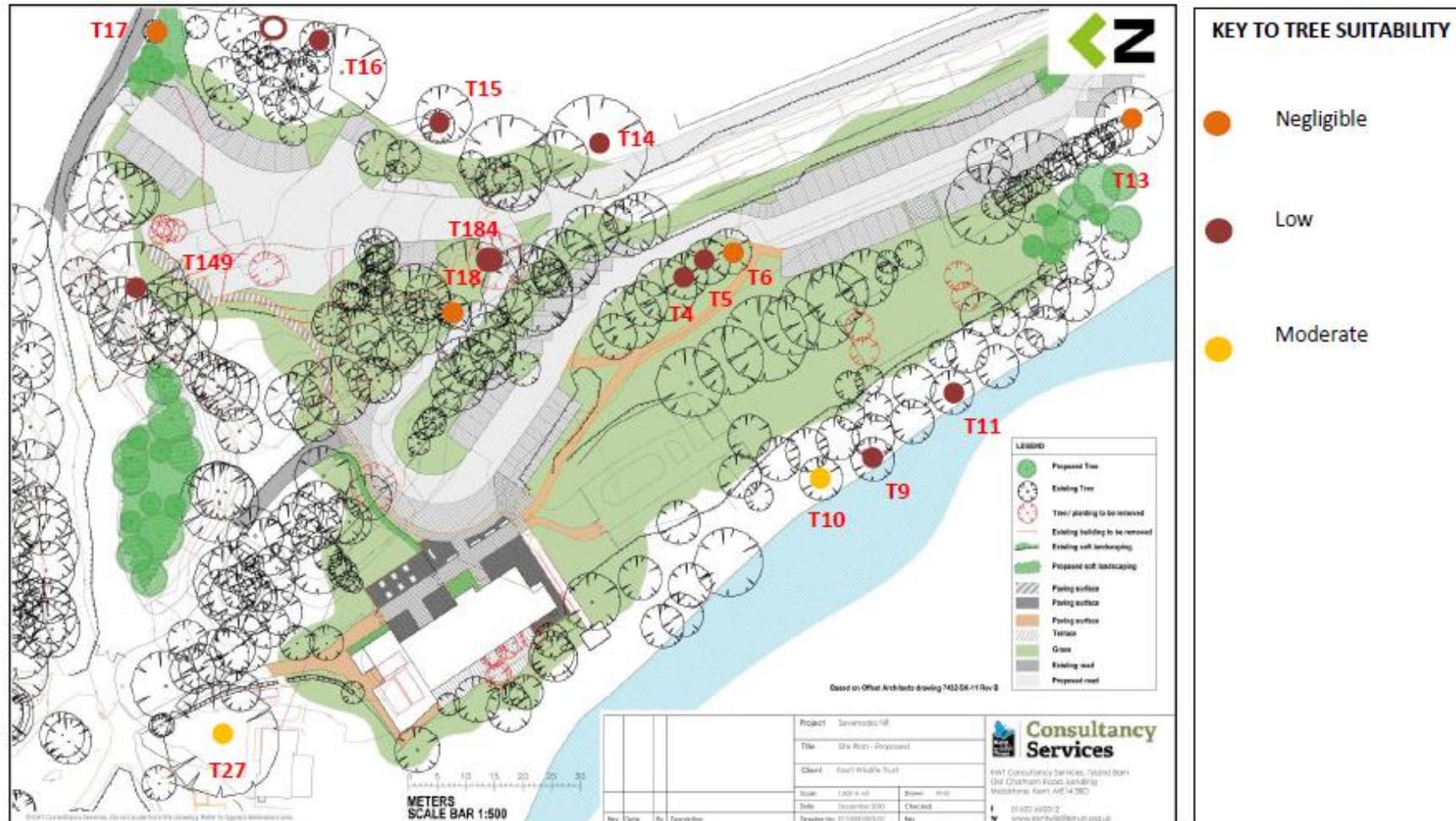


Figure 3: Results of the Preliminary Ground Level Roost Assessment of trees



2 INTRODUCTION

Kent Wildlife Trust is seeking to obtain planning permission for improvements to the existing visitor experience at its Sevenoaks Wildlife Reserve. The land subject to development proposals comprises a c.1.75ha area located in the south-west of Sevenoaks Wildlife Reserve and Site of Special Scientific Interest (SSSI), on the northern periphery of Sevenoaks town in Kent.

The current proposals are understood to include the following:

- Demolition of four structures (B1, B2, B4 and B5) and several containers to facilitate new access and parking areas
- Renovation of building B3
- Removal of a low number of trees in the vicinity of B8 and the enlarged parking areas and one way road system
- Extension and renovation of the existing visitor centre building (B8) – including recladding for improved thermal performance, requiring the temporary removal of all roof tiles and timber weatherboarding from all elevations
- Installation of air sourced heat pumps within the visitor centre and photo voltaic panels on the visitor centre roof
- Resurfacing of all access routes and parking areas
- New play area to east of visitor centre
- New areas of tree planting and soft-landscaping in the north, east and west of the site.

2.1 Background

KWT CS was previously commissioned to undertake a Preliminary Ecological Appraisal (PEA), Preliminary Roost Assessment (PRA) and Preliminary Ground Level Roost Assessment (PGLRA) at the site. The surveys identified five structures area (B2, B3, B5, B6 and B8) and several trees with suitable bat roosting features within and immediately adjacent to the survey area, as well as moderate suitability foraging habitat which is continuous with the high suitability habitat of the wider Reserve. The surveys were undertaken during March/April 2020.

2.2 Scope of work

KWT Consultancy Services (KWT CS) was commissioned to undertake bat presence/likely absence surveys of the five structures with suitable features for roosting bats which will be directly or indirectly impacted by the proposals (B2, B3, B5, B6 and B8) and the mature oak tree (T27) lying immediately adjacent to B6 - herein termed as the 'survey area'.

Kent and Medway Biological Records Centre (KMBRC) was contacted and asked to provide a standard data search report for the survey area and its environs, which included bat records from Kent Bat Group for the surrounding 5km and a map of known bat roosts within 1km.

Activity monitoring surveys were not undertaken – the total area of suitable habitat to be impacted was such that sufficient information on foraging behaviour could be obtained during the presence/likely absence surveys.

This report also includes the findings of the internal inspections which formed part of the PRA but were undertaken at a later date due to restricted access in March/April 2020 as a result of the Covid-19 pandemic.

This report provides the results and findings of the presence/likely absence surveys which were commissioned and undertaken during the summer of 2020 and winter of 2021, and should be read in conjunction with the PEA/PRA report (KWT CS, July 2020).

2.3 Survey area

The survey area comprises an area of approximately 1.75ha located at Sevenoaks Wildlife Reserve, Bradbourne Vale Road, Sevenoaks, TN13 3DH, central OS grid reference TQ 51941 56691. The general location and extent of the survey area is shown on the plan in Figure 1.

A total of seven structures are present within the survey area - a derelict outbuilding with no roof (B1), a timber-framed shed with walls and roof of corrugated metal (B2), a timber-framed hut with walls of weatherboard-cladding (B3), two adjoined metal containers (B4), a small timber framed utilities building with plywood roof and walls (B5), a single-storey bungalow (B6) and a two-storey visitor centre (B8). Habitats within the survey area comprise amenity grassland, broadleaved woodland edge, dense scrub and scattered trees with areas of bare ground and hard-standing.

The land subject to development proposals comprises a c.1.75ha area located in the south-west of Sevenoaks Wildlife Reserve and SSSI, on the northern periphery of Sevenoaks town in Kent. The reserve is owned by Tarmac and leased / managed by Kent Wildlife Trust and comprises a 73ha area including five lakes and surrounding areas of broadleaved woodland with dense scrub, numerous smaller lakes and ponds, wet woodland and reedbed, with a number of bird hides and trails for public use. The river Darent flows through the north of the reserve. The reserve is all designated as SSSI for its breeding wetland bird assemblage and Downy Emerald dragonfly, and also sits in an area identified in the Sevenoaks District Plan as an Area of Archaeological Potential, and Metro Greenbelt.

2.4 Survey Objectives

The primary objectives of the bat surveys were as follows:

- Identify the presence of any bat roosts during the summer and hibernation periods;
- Assess the likely impacts of the proposed development on any identified bat roosts;
- Provide recommendations for mitigation and compensation with regard to any bat roosts identified;
- Assess the significance of the survey area for foraging and/or commuting bats and provide recommendations with regard to the retention and enhancement of any foraging and commuting habitat post-development;
- Assess the likely impacts of increased artificial lighting on retained structures, trees and foraging/commuting habitat as a result of the proposed development and recommend appropriate mitigation.

3 LEGISLATIVE AND PLANNING POLICY FRAMEWORK

All British bat species receive legal protection in the United Kingdom. The Conservation of Habitats and Species Regulations 2017 (as amended) legally protects all bat species in the UK and further protection is afforded by the Wildlife and Countryside Act 1981 and the Countryside and Rights of Way Act 2000. Taken together, it is an offence to:

- deliberately capture (or take), injure or kill a bat.
- deliberately or recklessly disturb a bat, in particular (i) any disturbance which is likely to impair their ability to survive, to breed or reproduce, or to rear or nurture their young; (ii) any disturbance which is likely to impair their ability in the case of hibernating or migratory species, to hibernate or migrate; or (iii) any disturbance which is likely to affect significantly the local distribution or abundance of the species to which they belong.
- damage or destroy a breeding site or resting place (roost) of a bat.
- intentionally or recklessly obstruct access to a roost (i.e. a structure or place used for shelter or protection).

Under the law, a roost is ‘any structure or place used for shelter or protection’. This could be any structure, for example, any building or suitable tree. Bats use many roost sites and feeding areas throughout the year. These vary according to bat age, condition, gender and species, as well as season and weather. Since bats tend to re-use the same roosts for generations, the roost is protected whether the bats are present or not.

Under the Natural Environment and Rural Communities (NERC) Act 2006, the presence of a protected species is a material consideration when an LPA is considering a development proposal that, if carried out, would be likely to result in harm to the species or its habitat (ODPM 06/2005, paragraph 98). Under Section 40 of the Act, local authorities are legally obliged to have regard for the purposes of conserving biodiversity, specifically those habitats and species listed as being of Principal Importance under Section 41. Several species of bat are listed, including brown long eared *Plecotus auritus*, noctule *Nyctalus noctula* and soprano pipistrelle *Pipistrellus pygmaeus*.

In July 2018, the UK Government published the revised National Planning Policy Framework (NPPF) which states that “opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity” (Para 175). This requires that ecological enhancements for habitats and species, including bats, be incorporated into proposed developments to contribute towards the objectives of planning legislation.

Additional protection for rarer species and important feeding areas

Four species of bat, the two horseshoes, barbastelle and Bechstein’s are included within Annex II of the Habitats Directive for which Member States are required to designate Special Areas for Conservation (SACs) for their protection.

The UK is a signatory to the Agreement on the Conservation of Bats in Europe, established under the Bonn Convention. The Fundamental Obligations of Article III of this Agreement require the protection of all bats and their habitats, including the identification and protection from damage or disturbance of important feeding areas for bats.

4 METHODOLOGY

4.1 Desk study

KMBRC was contacted and asked to provide a standard data search report for the survey area and its environs, which included bat records from Kent Bat Group for the surrounding 5km and a map of known bat roosts within 1km.

4.2 Preliminary Roost Assessment

Six structures within the survey area (Figure 1, B1-B6) were subject to external assessment in dry and still conditions on 20th March and 10th April 2020; B1 was also assessed internally at this time due its being partially open-sided. Full details of these PRA surveys are detailed in the Preliminary Bat Roost Assessment report (KWTCS, April 2020).

Access into buildings was not possible during March/April due to the Covid-19 pandemic. The internal assessments of B2, B3, B5 and B6 were therefore undertaken on 11th and 12th May 2020. In addition, the existing visitor centre B8 was added to the design for the scheme at this stage and an external and internal PRA of the building was carried out on 12th May 2020. The results of these surveys are presented within this report.

All PRAs were overseen by licensed ecologist Gabrielle Graham of Surrey Wildlife Trust (SWT) Ecology Services holding a Level 2 class bat survey licence (Licence number 2016-24355-CLS-CLS) and undertaken by Dr Clair Thackray of KWT CS, who has received extensive training in undertaking preliminary roost assessment surveys from the Bat Conservation Trust, Bat Training Ltd. and licensed colleagues, and has undertaken PRA surveys and bat presence/likely absence surveys across Kent as an ecological consultant since 2014.

The PRAs included an inspection for access points and potential roosting features including gaps in the roof, walls and soffits, and lifted or damaged tiles or timbers, and a search for evidence of bats including droppings, staining and bats themselves. Bat droppings were searched for on the top of surfaces (where they are less likely to have been disturbed or damaged), windowsills, cobwebs and on the floor/ground. There are no roof voids within B1, B2, B3, B4, B5 and B8. A single void runs for the length of B6 and this was fully accessible. A high powered torch was used in the search. The assessment was carried out in accordance with best practice guidelines (Collins, 2016). Any droppings collected during the internal assessments were sent to EcoWarwicker Ecological Forensics for DNA analysis and species confirmation. Any signs of breeding birds were also noted.

4.3 Preliminary Ground Level Roost Assessment of Trees

All mature and semi-mature trees within the survey area were subject to a Preliminary Ground Level Roost Assessment (PGLRA) for their suitability for support roosting bats. Full details of the survey are detailed in the Preliminary Bat Roost Assessment report (KWTCS, April 2020). An impact assessment with regard to trees identified with suitable features for roosting bats is included within this report.

4.4 Presence/Likely absence endoscope survey

Accessible bat boxes on B8, gaps behind plywood boards on the walls of B1, lifted timbers on the western elevation of B3, soffit boxes on B5 and the mature oak tree (T27) were subject to a daytime inspection using an 'Eazyview' endoscope, which has an 8mm camera on a 1.5m coil, with 4x zoom, lighting, video and photographic functions. The Eazyview can be used to detect objects of less than 3mm in size and all images are date and time stamped. The inspection followed the published guidance 'Method Statement for Appropriate Use of Fibrescopes by Arborists' (Bat Conservation Trust, September 2015) and was carried out on 7th July 2020 by Gabrielle Graham of SWT (Licence no. 2016-24355-CLS-CLS), Dr Clair Thackray and Marie Dipple of KWT CS.

Any droppings collected during the endoscope inspection were sent to EcoWarwick Ecological Forensics for DNA analysis and species confirmation.

4.5 Presence/likely absence surveys

On the basis of the PRA findings, presence/likely absence surveys for bats were considered necessary for five of the seven buildings: B2, B3, B5, B6 and B8. Surveys were also undertaken of tree T27 which was identified as supporting features suitable for roosting bats during the PGLRA. The surveys were carried out between 22nd June and 10th August 2020.

Surveys were designed and completed under the supervision of licensed ecologist Gabrielle Graham of SWT Ecology Services and the field surveyors were Dr Clair Thackray, Neil Coombs, Marie Dipple, Craig Midwinter and Camilla Blackburn, all of KWT CS.

The seasonal and daily timings of the surveys followed best practice guidelines (Collins, 2016) and are summarised in Table 1 below. Weather data on temperature, rain and wind speed conditions was recorded for each survey. All bat calls were recorded using EM Touch Pro and Peersonic RPA3 bat detectors to enable species identification to be verified through sonogram analysis using Kaleidoscope software. The number and positioning of the surveyors was such that all elevations could be clearly seen; Figure 3 shows a map of surveyor locations for each of the buildings.

Table 1 Presence/likely absence survey dates and weather conditions

Building / Tree number	Roost suitability	Survey number	Survey date	Sunset/sunrise	Survey start/Survey end	Weather Conditions
B2	Low	1	21/7/20	21.02	20.47 / 22.32	Temp start/end: 16/14°C Rain: None Wind (BF): 0-1 Cloud: 100% (high cloud)
B3	Moderate	1	21/4/20	20.06	19.51 / 21.36	Temp start/end: 11/10°C Rain: None Wind (BF): 0 Cloud: 90% (high cloud)

Building / Tree number	Roost suitability	Survey number	Survey date	Sunset/sunrise	Survey start/ Survey end	Weather Conditions
		2	4/6/20	21.09	20.54 / 22.39	Temp start/end: 12 / 11°C Rain: None Wind (BF): 3 Cloud: 90%
B5	Low	1	29/7/20	20.50	20.35 / 22.20	Temp start/end: 18 / 15°C Rain: None Wind (BF): 2-3 Cloud: 0%
B6 / Tree T27	Moderate	1	22/6/20	21.19	21.04 / 22.49	Temp start/end: 16 / 14°C Rain: None Wind (BF): 1 Cloud: 80% (high cloud)
		2	7/7/20	21.15	21.00 / 22.45	Temp start/end: 13 / 13°C Rain: None Wind (BF): 2 Cloud: 50%
B8	Moderate	1	1/7/20	21.18	21.03/22.48	Temp start/end: 16 / 14 Rain: None Wind (BF): 2 Cloud: 100%
		2	10/8/20	05.38	04.08/05.53	Temp start/end: 20 / 20 Rain: None Wind (BF): 0-1 Cloud: 5%

4.6 Hibernation surveys

Suitable features for hibernating bats were identified within four structures – B3, B5, B6 and B8 - and one tree - T27 - during the PRA and PGLRA.

Where suitable roosting sites have been proven or recorded as being suitable for hibernation, Natural England require information as to the presence/likely absence of hibernating bats. The Bat Conservation Trust's Good Practice Guidelines for Bat Surveys (Collins' 2016) recommend that a minimum of two survey visits are undertaken, one in mid-January and one in mid-February. Where a structure contains a void suitable for hibernating bats, automated-static surveys should be undertaken for a minimum of two weeks in both January and February.

4.6.1 Endoscope hibernation surveys

Suitable crevice and cavity features for hibernating bats were identified within three of the buildings – B3, B5 and B8 – and tree T27. A daytime inspection of these features was undertaken using an ‘Eazyview’ endoscope (as described in paragraph 4.4). Inspections were carried out on 16th January and 15th February 2021 by Dr Clair Thackray acting as an accredited agent under the Level 2 Class Bat Survey licence of Gabrielle Graham (number (No 2016-24355-CLS-CLS)). Weather data was collected during each survey visit.

The surveys included the following features:

- B3 Lifted / damaged timbers and associated cavity on western elevation.
- B5 Timber soffits on northern and western elevations
- B8 Six bat boxes on western, southern and south-eastern elevations
- T27 All suitable features

4.6.2 Static monitoring hibernation surveys

A Peersonic RPA3 static monitoring bat detector was placed within the single loft void of building B6 for two 2-week periods: 16 - 30th January, and 15th February - 1st March, 2021. The detector was set to record every day from 30 minutes before sunset to 30 minutes after sunrise.

Site visits were made at three day intervals to retrieve any recorded echolocation data for sonogram analysis and to replace batteries. Data on percentage humidity and maximum / minimum temperature within the loft was collected throughout each survey period.

4.7 Limitations

PRA

Building B4 comprises two adjoined metal containers previously used as public conveniences. The containers were locked and not accessible for an internal inspection. There were no access features or evidence of bats noted and the building materials are unlikely to be suitable for roosting bats due to lack of crevices or hanging places and thermal instability. The results of the PRA are therefore considered reliable.

Presence/Likely absence surveys

Activity monitoring surveys were not undertaken – the total area of suitable habitat to be impacted was such that sufficient information on foraging behaviour could be obtained during the presence/likely absence surveys. It is considered that the level of bat foraging and commuting activity within the survey area has been adequately assessed.

The reserve has been subject to continuous anti-social behaviour during the Covid-19 pandemic and for the safety of the surveyors it was decided not to undertake dawn re-entry surveys of buildings other than those which have security alarms and are located next to surveyor car parking areas (B6 and B8). The two surveys of building B3 were therefore both dusk emergence surveys. During the second survey of B3 it was noted that bird nesting material occupied the previous roost feature, continued bat presence at this time was therefore unlikely and the results of the survey are considered reliable.

During the endoscope survey of bat boxes on building B8, the southernmost box on the western elevation could not be inspected as there was insufficient space for the ladder to be safely positioned. This box was observed during the dusk emergence and dawn re-entry surveys and no bats were recorded; it is considered that the box has been adequately assessed.

General

The survey area has been assessed on the basis of the development layout provided by the client at the time of the surveys. Should development plans change to encompass additional areas, the PRA, PGLRA and bat presence/likely absence surveys will need to be extended or updated respectively.

When assessing EPS licence applications, Natural England usually requires survey data from the most recent survey season.

For buildings where no bat roosts are discovered, the validity of the survey data ranges from 12-18 months depending on the extent of suitable features within the structure.

5 RESULTS

5.1 Desk Study

The KMBRC search results indicated that ten species of bat have been recorded within a 5km radius of the site, with records dating back to 1986. For the surrounding 1km-radius, which includes the wider reserve, there are records of Daubenton's *Myotis daubentonii*, Serotine *Eptesicus serotinus*, Natterer's *Myotis nattereri*, Noctule *Nyctalus noctula*, Nathusius' pipistrelle *Pipistrellus nathusii*, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus* and brown long-eared bat *Plecotus auritus*.

A hibernation roost of Daubenton's bat was recorded within a bat box on the existing visitor centre building during 2019.

5.2 Preliminary Roost Assessment

The findings of the PRA inspections of buildings B2, B3, B5 and B6 are detailed in Table 2. Both an external and internal PRA of B8 were also undertaken during May 2020, the results are shown in Table 3.

Table 2 Internal PRA results for B1-B6

Structure	Internal Description	Suitability	Survey Recommendations
B1	Refer to KWTCS, April 2020	Low suitability - may be used on an opportunistic basis by individual bats.	Endoscope inspection of all features. Single dusk emergence or dawn re-entry survey pending outcome of endoscope check.
B2	Gaps between the timber soffits and metal walls were of suitable size for crevice dwelling species. Gaps into the building were noted above the doorway and at corners of the building. A small timber-framed, open-sided extension is located on the western elevation. The building is located within a shaded area which may reduce temperature fluctuations and the lack of windows or skylights create a dark interior. Wooden beams within the building and open-sided extension provide potential resting places, although the latter is open to ambient weather conditions. No evidence of bats was noted.	Low suitability - may be used on an opportunistic basis by individual bats.	Single dusk emergence or dawn re-entry survey.
B3	The building is in frequent use and brightly lit by natural light due to several large windows. The ceiling is boarded at the rafters with no roof void. The northern edge of the pitched roof covers a small porch; there is no roof void above this porch. Access into the building via damaged timbers is possible but no evidence of bats was noted. A flat roofed timber-framed tool-store is attached to the southern elevation. No evidence of bats was found but access possible via gaps above the access doors and at the corners.	Moderate suitability features for crevice dwelling species.	Two presence/likely absence surveys recommended: one dusk emergence and one dawn re-entry survey.
B4	Structure locked long term with tightly sealed metal doors; refer to KWTCS April 2020 for description of structure.	Negligible suitability for roosting bats due to the temperature fluctuations associated with this material and likely exposure to the external elements.	No additional surveys required
B5	The inside of the structure is dark internally due to the lack of windows but open to the ambient weather conditions due to the wall of the southern elevation having been partially removed. No evidence of bats internally.	Low suitability	Single dusk emergence survey
B6	The building is used as an education facility; the rooms were dark internally	Roost presence	Two roost characterisation surveys:

Structure	Internal Description	Suitability	Survey Recommendations
	<p>due to blinds on all windows and a chimney breast opens into one room. No evidence of bats was found within the living area.</p> <p>The roof is single-pitched on an east-west axis – a single loft void c.1.75m in height runs the length of the building. The roof is covered by multiple layers of 'sweet chestnut shakes' - the underside of the tiles was visible from inside the loft and there were no access gaps where light came through. A potential access hole was noted at ridge height on the eastern gable end and a single bat dropping, believed at the time to be a dropping of a long-eared bat species, was found together with several moth wings beneath the ridge beam halfway along the roof. A pipistrelle bat dropping was also found on the loft floor near the eaves of the southern elevation. Both droppings were collected for DNA analysis.</p>	confirmed by dropping presence and likely feeding remains - moderate suitability for crevice and void dwelling species	one dusk emergence and one dawn re-entry survey.

Table 3 External and Internal PRA results for B8

Structure	PRA Results	Suitability	Survey Recommendations
B8	<p>External assessment:</p> <p>Large two storey brick structure covered with wooden cladding on all elevations. Single pitch roof on north-south axis covered with concrete interlocking tiles which appear intact other than very small (<1cm) gaps at the interlocking point where some tiles have moved slightly; ridge tiles all appear to be intact. Dense covering of moss is present on most of the roof and ridge tiles. A wooden barge board is present on all elevations. The eaves are boarded creating shallow soffits of c.10cm depth. The majority of the soffits are intact; access was noted via a hole in the soffit on the southern gable end. Multiple lifted timbers were noted at a range of heights on both southern and western elevations, providing crevices between the timber cladding and the brick walls. An access door is present on the NW corner and a narrow gap was noted between the timber frame and the building wall. There are several elder trees growing adjacent to the western elevation but there are still multiple opportunities to access crevices beneath the lifted timbers. The timbers on the northern and eastern elevations appear broadly intact and sheltering opportunities are limited to spaces behind small metal air vents on the northern elevation and two large wooden "Visitor Centre" signs on the eastern elevation.</p>	Moderate suitability for crevice dwelling species.	<p>Two presence/likely absence surveys: one dusk emergence and one dawn re-entry.</p> <p>Endoscope check of accessible bat boxes on southern and western elevations.</p>

Structure	PRA Results	Suitability	Survey Recommendations
	<p>A timber-framed open-sided lean-to is present on the southern and eastern elevations - the roof is formed of concrete inter-locking tiles and is open to the rafters with exposed timbers. The lean-to covers the café seating area and is therefore in regular use by the public; the space is brightly lit and there are a negligible number of dark crevices between the roof timbers. Features noted include a split roof beam, a c.2cm gap between the lean to timbers on the SW corner and a gap between the corner timber and the wall of the main building on the SW corner. One small gap beneath a lifted roof tile was noted on the western edge of the lean-to.</p> <p>Six bat boxes are attached to the building: one on the SE corner, three on the southern and two on the western elevation. In 2019, a Daubenton's bat was recorded hibernating within one of the bat boxes (section 5.1).</p> <p>Internal assessment:</p> <p>Internally the ceiling is vaulted and tiled at the rafters with no roof void; the internal two-storey space is predominantly well lit other than small walk-in storage areas. Some damaged ceiling tiles provide potential for access from below the roof tiles into the living space but the internal check of the upstairs rooms found mice droppings only. There is a c.10-20cm deep gap between the roof and ceiling tiles. No evidence of bats was found.</p>		
B8 Outbuildings	<p>A small wooden shed is located to the west of the building B8; the shed has windows on three elevations and is therefore well lit internally. The low single pitched roof is covered with roofing felt; loose felt was noted along the eaves on the N and S elevations. The eaves are open /unboarded. A potential access hole was noted at the ridge on the eastern elevation; this was cobweb-filled at the time of the survey. A <1cm access gap is present above the door and narrow (5cm wide) lifted timbers were noted above the windows on the southern elevation. No other lifted timbers, crevices or access holes were noted.</p> <p>Two metal storage containers and an open-sided timber framed storage structure lie immediately north of B8. The containers were locked and tightly sealed with no access opportunities and no external features. The timber-framed structure has a roof of corrugated bitumen sheeting; several damaged sheets were noted with access opportunities between sheet-layers. A narrow <1cm gap was noted between the wooden roof support beam and timber barge board on the northern elevation. The structure is brightly lit and open</p>	Negligible	No additional surveys required

Structure	PRA Results	Suitability	Survey Recommendations
	to ambient weather conditions; it is used for timber storage, with regular disturbance.		

5.3 Presence/Likely absence surveys

5.3.1 Building B2

No bats were observed emerging from or entering B2 during the dusk emergence survey. Five species were recorded, with continuous passes by soprano pipistrelle, several passes by common pipistrelle and noctule, and individual passes by Daubenton's and Leisler. The earliest recordings were for noctule and soprano pipistrelle at 21.07, five minutes after sunset. Soprano pipistrelle has a mean emergence time of 33.5 minutes after sunset (range 12-55 minutes, Andrews & Pearson, 2016), indicating that a roost of soprano pipistrelle is likely to be situated nearby. Noctule has a mean emergence time of 7 minutes after sunset (range 12 before to 46 minutes after, Andrews & Pearson, 2016), indicating that there may also be a noctule roost within the vicinity. The results of the surveys are summarised in Appendix 3, Table 3.1.

5.3.2 Building B3

During the first dusk emergence survey, the first record was of one Nathusius' pipistrelle which was observed emerging from beneath lifted timber cladding on the western elevation at 19 minutes after sunset – the expected range for emergence of this species is 11-50 minutes after sunset (Andrews & Pearson, 2016). No bats were observed emerging from or entering B3 during the second survey; on inspection after the second survey, bird nesting material was noted within the roost feature. The first recording of a bat during the second survey was of *Myotis* at 21.11, two minutes after sunset. *Myotis* emergence times range from 25 minutes before to 1.5 hours after sunset (Andrews & Pearson, 2016) – the time of emergence could indicate that a *Myotis* roost is located nearby.

During the first survey, there were foraging and passes by at least five species recorded, with prolonged periods of activity by common and soprano pipistrelle and serotine, and individual passes by noctule, confirmed passes by Daubenton's and passes by one or more unconfirmed *Myotis* species. Activity levels were similarly high during the second survey with at least five species recorded, including continuous foraging by common and soprano pipistrelle, several passes by Daubenton's and noctule, and a low number of passes by Nathusius' and *Myotis* sp. The results of the surveys are summarised in Appendix 3, Table 3.2.

5.3.3 Building B5

No bats were recorded emerging from or entering B5 during the dusk emergence survey. The earliest recordings were for a soprano pipistrelle and noctule at 2 and 9 minutes after sunset respectively. Given the mean emergence time for soprano pipistrelle, the call is likely to indicate a roost in close proximity. At least seven species were recorded foraging and commuting, including single passes by Nathusius', brown long-eared and a *Myotis* species. The results of the surveys are summarised in Appendix 3, Table 3.3.

5.3.4 Building B6

Two bat roosts were confirmed within B6 during the surveys. During the first survey of B6, a common pipistrelle emerged from beneath a roof tile on the southern elevation at 21.52, 33 minutes after sunset; common pipistrelle tend to emerge 6-43 minutes after sunset (Andrews & Pearson, 2016). During the second survey, a soprano pipistrelle emerged from beneath a hanging tile on the eastern gable end at 21.33, 18 minutes after sunset.

Brown long eared was first recorded at 22.02, 43 minutes after sunset; brown long eared has a mean emergence time of 61 minutes after sunset (Andrews & Pearson, 2016), suggesting the proximity of a roost nearby.

Seven species were recorded across the two surveys, comprising the same species as recorded within the wider survey area. The first survey included frequent foraging by common and soprano pipistrelle, with singular passes by brown long-eared and noctule. The level of activity and species diversity were higher during the second survey, with continuous passes by soprano pipistrelle and noctule, frequent passes by common pipistrelle and singular passes by Daubenton's and Leisler. The results of the surveys are summarised in Appendix 3, Table 3.4.

5.3.5 Tree T27

No bats were recorded emerging or entering T27 during the dusk emergence survey. Two passes were observed by common and soprano pipistrelle. The results of the survey are summarised in Appendix 3, Table 3.5. T27 was also subject to a second presence/likely absence survey via an endoscope inspection - see Section 5.4.

5.3.6 Building B8

During the first dusk emergence survey no bats emerged from features within the building structure but at one minute after sunset a soprano pipistrelle emerged from a bat box on the southern elevation. At 44 minutes after sunset, a second soprano pipistrelle emerged from a bat box located on the south-eastern corner of the building. No bats were recorded re-entering either the building or bat boxes during the dawn re-entry survey.

A minimum of four species were recorded during the surveys, comprising the same species as recorded within the wider survey area. Soprano pipistrelle was the most frequently recorded, with periods of continuous passes and foraging recorded throughout both surveys. Common pipistrelle was the second most recorded species with frequent passes during both surveys. Singleton passes by *Myotis* species, noctule and *Nyctalus* or serotine were also recorded. The majority of passes were heard and not seen. The results of the surveys are summarised in Appendix 3, Table 3.6.

5.4 Presence / Likely absence endoscope surveys

During the endoscope inspection no evidence of bats was found within features on tree T27, or within buildings B1, B3 and B5. Bird nesting material was found within the roost feature of B3, suggesting that this was used as a transition roost earlier in the season. Inspection of the bat boxes on the southern elevation of B8 identified one box containing a bat, one dropping within a second box and >50 droppings below the array of boxes. All droppings were later confirmed as soprano pipistrelle (see paragraph 5.6) and this species was also recorded emerging during the dusk emergence survey; the roosting bat could not be clearly seen for identification purposes during the endoscope survey but is most likely to have been a soprano pipistrelle based on the DNA and dusk emergence survey evidence. The results of the endoscope surveys are provided in Table 4.

Table 4 Summary data for the presence/likely absence endoscope survey

Building / Tree No.	Feature and location	Notes
T27	Lightning strike/frost crack and hole on northern aspect	No evidence of bats but features confirmed to provide opportunities for shelter with moderate suitability for roosting bats.
B1	Plywood boards attached to inside of concrete walls	On inspection the boards were found to provide no shelter from the elements as they are open to natural light, rainfall etc. at the top.
B3	Lifted timbers on western elevation	No evidence of bats. Bird nesting material present within previous location of transition roost of Nathusius' pipistrelle.
B5	Gaps providing access into wooden soffit box on eastern elevation	No evidence of bats. Soffits damp internally with moss/fungi present.
B8	Three bat boxes on southern elevation	Unidentified bat present within westernmost bat box; soprano* pipistrelle dropping collected from middle box. Scattering of >50 soprano* bat droppings below array of boxes.
	Northernmost bat box on western elevation	No evidence of use by bats.

* Confirmed by DNA analysis

5.5 Results of DNA analysis

Individual bat droppings from what were considered to be two different bat species were found on the floor of the loft within B6; a single dropping was found within one of the bat boxes on the southern elevation of B8 and a pile of >50 droppings was found on the mezzanine roof below the bat boxes. These were sent for mitochondrial DNA analysis; the results are summarised in Table 5 and full results are included in Appendix 2.

Table 5 Summary of mitochondrial DNA analysis

Building No.	Feature and location	DNA results
B6	Single dry dropping collected from within the loft void below ridge board	Species identification was not possible from the single dropping, possibly due to decay. Likely to be from a long-eared species and moth wings also present at the time of collection.
	Single dropping collected from within the loft void close to the eaves at SE corner of building	Confirmed as soprano pipistrelle
B8	Southern elevation of B8 – single dropping collected from the middle box of three and several droppings from the floor below	All droppings confirmed as soprano pipistrelle

5.6 Hibernation surveys

5.6.1 Presence / Likely absence endoscope surveys

During the January endoscope inspection no evidence of hibernating bats was found within T27, B3, B5 or B8. During February, inspection of the bat boxes on the southern elevation of B8 identified one box containing a single pipistrelle bat. Survey data is provided in Table 6.

Table 6 Results of the hibernation endoscope surveys

Date	Time	Weather	Building / Tree No.	Feature and location	Notes
16/1/2021	11.00 – 14.00	Temp start/ end: 6 / 9°C Rain: None Wind (BF): 1 Cloud: 30%	T27	Lightning strike/frost crack and hole on northern aspect	No evidence of hibernating bats
			B3	Lifted timbers on western elevation	No evidence of hibernating bats
			B5	Timber soffits on western and northern elevations	No evidence of hibernating bats
			B8	Two bat boxes on western elevation	No evidence of hibernating bats
				Three bat boxes on southern elevation	No evidence of hibernating bats
				One box on south-eastern corner	No evidence of hibernating bats
15/2/2021	9.30 – 12.00	Temp start/ end: 8 / 10°C Rain: None Wind (BF): 1 Cloud: 100%	T27	Lightning strike/frost crack and hole on northern aspect	No evidence of hibernating bats
			B3	Lifted timbers on western elevation	No evidence of hibernating bats
			B5	Timber soffits on western and northern elevations	No evidence of hibernating bats
			B8	Two bat boxes on western elevation	No evidence of hibernating bats.
				Three bat boxes on southern elevation	One pipistrelle in middle bat box

Date	Time	Weather	Building / Tree No.	Feature and location	Notes
				One box on south-eastern corner	No evidence of hibernating bats.

5.6.2 Static monitoring hibernation survey

During the January survey there were no echolocation recordings made by the detector and therefore no evidence of hibernating bats. The minimum temperature recorded within the void of B6 was -1.5°C and the maximum was 7.3°C. Humidity ranged from 79-93%. During the February survey, there were no echolocation recordings made by the detector and therefore no evidence of hibernating bats. The minimum temperature recorded within the void of B6 was -2.7°C and the maximum was 10.3°C. Humidity ranged from 73-93%.

The humidity values lie within the optimum range for species recorded at the site. The temperature range included sub-optimal temperatures - a minimum of 2°C is considered optimal (Altringham, 2003) and locations where temperatures are normally < 0°C are likely to be less suitable (Dietz, Helversen and Nill, 2009).

5.7 Roost Characterisation

Eight confirmed roosts and one suspected roost were identified during the surveys. Roost characterisation and conservation significance information is provided in in Table 7 below.

Table 7 Roost Characterisation and Conservation Significance

Building No.	Roost No.	Roost Characterisation	Species	Conservation significance
B3	1	Transition Day roost	Nathusius'pipistrelle	Moderate
B6	2	Day	Common pipistrelle	Low
	3	Day	Soprano pipistrelle	Low
	3a	Day/night/ feeding	Brown long eared – unconfirmed droppings	Low
B8	4	Day	Soprano pipistrelle	Low
	5	Day	Soprano pipistrelle	Low
	6	Day	Soprano pipistrelle	Low
B8	7	Hibernation (2019)	Daubenton's	Low-Moderate
B8	8	Hibernation (2021)	Pipistrelle sp.	Low-Moderate

5.8 Records of bat foraging

Sevenoaks Wildlife Reserve is a 73ha area which supports continuous habitat of high suitability for foraging and commuting bats, comprising extensive broad-leaved woodland and dense scrub, numerous large areas of open water, a river corridor and marshland / wet woodland habitats; these areas are also continuous with suitable areas in the wider landscape. The habitats within the survey area are of moderate suitability for foraging and commuting bats, comprising broadleaved woodland edge, dense scrub, mature hawthorn hedgerow,

scattered trees and areas of short-sward semi-improved grassland which are well connected to the wider reserve to the north, east and west, and to grazed fields and allotments to the south. Of the eight species known to occur within a 1km radius of the survey, seven were confirmed during the surveys. In addition, Leisler was recorded on several occasions.

6 IMPACT ASSESSMENT

6.1 Impact Assessment – Building Roosts

The development proposals involve the demolition of buildings B1-B5 and renovations to building B8. Building B6 will not be directly impacted by the works but lies in close proximity to areas where additional artificial lighting is likely.

The proposals and potential impacts are summarised as follows:

- Demolition of four structures (B1, B2, B4 and-B5) and renovation of one structure (B3) to facilitate new access and parking areas – *Temporary loss of one building with a bat roost of Nathusius pipistrelle*
- Removal of a low number of trees in the vicinity of B8 and the proposed new parking areas – *One tree with suitable features (T184) is being removed*
- Renovation of the visitor centre building B8 (including re-cladding and improved thermal insulation), requiring the temporary removal of all roof tiles and timber weatherboarding from all elevations – *Temporary loss of three day roosts and two hibernation roosts all located in bat boxes*
- Increased artificial lighting associated with the development – *disturbance of roosting and foraging bats within and adjacent to the survey area*
- New areas of tree-planting and soft landscaping – *Increase in suitable foraging and commuting habitat.*

Without mitigation, the above proposals would result in the temporary loss, damage and/or disturbance of Roost 1 (transition day roost of Nathusius' pipistrelle), the temporary disturbance¹, potential damage and obstruction of Roosts 4-8 (three day roosts of soprano pipistrelle, one hibernation roost of Daubenton's and one hibernation roost of pipistrelle sp.), and the disturbance of Roosts 2-3a (day roosts of common/soprano pipistrelle and one suspected day, night or feeding roost of brown long-eared). The felling of T184 could potentially result in the killing or injury of any bat present. Increased artificial lighting could result in the disturbance of roosting and foraging bats within the development area. The scale of impacts in the absence of mitigation is detailed below.

Building B3 – Roost 1

The renovation of B3 would involve the loss, damage or disturbance of a transition day roost of Nathusius' pipistrelle; this species is listed within the 'near threatened' category of the IUCN red list (Mathews, 2018) but is not a priority species under Section 41 of the NERC Act 2016. Within Kent, Nathusius' is described as 'scarce, often migrant' (Kent Bat Group, 2018). KMBRC provided records of two sightings but no roost records within a 5km radius

¹ Disturbance caused by increased human presence, extra noise and/or lighting, changes in the site layout and local environment.

of the survey area. Under the Bat Mitigation Guidelines (2016), the loss of small numbers of rarer species is of moderate conservation significance. The loss, damage or disturbance of one roost used by an individual bat therefore equates to a low level impact at site level on a roost of moderate conservation significance (Mitchell-Jones, 2004).

Building B8 – Roosts 4-8

The proposed building works would result in temporary disturbance, obstruction and likely damage of three day roosts of soprano pipistrelle and two small hibernation roost of Daubenton's and *Pipistrelle* sp.

Soprano pipistrelle is listed within the 'least concern' category of the IUCN red list but is included as a priority species under Section 41 of the NERC Act 2016. Within Kent, soprano pipistrelle is described as 'common' (Kent Bat Group, 2018) and there are 41 records of sightings and 5 roost records within a 5km radius. The loss of three small non-maternity day roosts of soprano pipistrelle equates to a low level impact at site level on roosts of low conservation significance (Mitchell-Jones, 2004). However, the cumulative effects of three roost sites being impacted should be taken into account.

Daubenton's is listed within the 'least concern' category of the IUCN red list and is not a priority species under Section 41 of the NERC Act 2016. Within Kent, Daubenton's is described as 'common near water' (Kent Bat Group, 2018) and there are 74 roost records within a 5km radius. Common pipistrelle is also listed within the 'least concern' category of the IUCN red list and is not a priority species under Section 41 of the NERC Act 2016. The temporary disturbance of two minor hibernation roosts equates to a medium level impact at site level on roosts of low to moderate conservation significance (Mitchell-Jones, 2004).

Building B6 – Roosts 2-3a

Increased artificial lighting within the development will potentially cause an indirect impact of disturbance on one day roost of common pipistrelle, one day roost of soprano pipistrelle and a suspected feeding/night/day roost of brown long-eared within building B6, potentially resulting in delayed emergence with subsequently reduced feeding and survival. The disturbance of the small day roost of common pipistrelle equates to a low level impact at site level on a roost of low conservation significance. The disturbance of the small day roost of soprano pipistrelle also equates to a low level impact at site level on a roost of low conservation significance.

Brown long-eared is listed within the 'least concern' category of the IUCN red list but is included as a priority species under Section 41 of the NERC Act 2016. The disturbance of a night roost or small day roost equates to a low level impact at site level on a roost of low conservation significance.

The cumulative impact on three roosts to the local bat population should also be taken into consideration.

6.2 Impact Assessment – Potential Tree Roosts

Fifteen trees within the survey area were identified to have suitable features for roosting bats during the PGLRA (KWT CS, April 2020). Of the 15, four were assessed to be of negligible suitability, nine were of low suitability and two were of moderate suitability (Figure 4). One

of the nine low suitability trees, a mature decaying oak T184, is to be removed as part of the proposals. The other trees that are to be removed – outlined in red on Figure 2 – do not support suitable features for roosting bats. Artificial lighting will be provided within the parking areas - measures to avoid potential impacts on retained trees with suitable features are detailed in Chapter 7.3.

6.3 Impact Assessment - Foraging and Commuting habitats

While no maternity roosts were confirmed within the survey area, preliminary research suggests that the core sustenance zones (CSZ) around communal (i.e. breeding) roosts of the species recorded within the survey area range from 2-4km, indicating that areas of foraging habitat within a wide radius of breeding roosts are important to the resilience and conservation status of communal roosts (Bat Conservation Trust, 2016).

The proposals include limited removal of native and non-native scrub and trees within the east of the survey area, with very little impact on the tree corridors that are present within the north, west and south of the survey area (Figure 2). The survey area currently comprises limited suitable habitat, particularly relative to the extensive adjacent woodland and waterbodies of the wider reserve, and it is considered that the works will not result in a significant loss of foraging habitat for the species recorded. Measures to avoid potential impacts of additional artificial lighting are provided in Chapter 7.3.

7 RECOMMENDATIONS

7.1 Outline mitigation strategy – Building roosts

A bat mitigation strategy is required to maintain the conservation status of the species affected by the development. A strategy based on the current proposals and survey results is detailed below.

Licensing

A full EPSM Licence will be required to permit the renovation of B3/Roost 1 and the temporary removal of bat boxes (Roosts 4-8) from B8. Natural England requires a minimum of 30 working days to process EPSM licence applications, and licences will only be granted within three months of the works start date. Data from the most recent survey season is required when applying for a licence.

Timing constraints

B3 - There is no evidence of a maternity roost within B3, as such it is recommended that the renovation of B3 be timed to avoid the period in which the roost was recorded as occupied (April to early May) and also to avoid the hibernation period. This will restrict works on B3 to the period June – October. Should a maternity roost be identified during the pre-works check detailed below then works to remove the feature and proceed with the renovation will be delayed until September/October. A check for nesting birds should be made prior to the renovation works.

B8 – The boxes are potentially used all year round. There was no evidence of a maternity roost, and as such it is recommended that the removal and relocation of bat boxes can be carried out during the period May-October, avoiding the hibernation period. Should a maternity roost be identified during the pre-works check detailed below then works to remove the relevant box will be delayed until September/October.

There are numerous suitable features beneath lifted timbers on the southern and western elevations of B8 and it is recommended that these are removed under the supervision of a licensed bat worker or accredited agent. To avoid the risk of disturbing hibernating bats it is recommended that the removal of these timbers, and also the roof tiles, is not carried out during the winter months; if this is not feasible then works may start but if bats are found then all works would need to stop until March/April.

Supervision

B3 – Prior to works on the building, an endoscope check of the feature on the western elevation will be undertaken, followed by the fitting of a one-way bat exclusion device. This will remain in place for a minimum of five consecutive nights in suitable weather conditions. An endoscope will then be used to check the feature again. During renovation works, the timbers on the western elevation will need to be removed by hand under Ecological Watching Brief with a licensed bat worker or accredited agent present in case bats are found. Any bats found will be removed by hand and placed in a suitable bat box installed on a nearby tree. Once the timbers have been removed, the renovation of the remainder of the building can proceed without supervision.

B8 – Prior to the removal of roosting features, an endoscope will be used by a licensed ecologist or accredited agent to check the bat boxes on the southern, south-eastern and

western elevations. If bats are found, the entrance of the relevant box/es will be soft-stopped while the box is removed and securely placed within a nearby tree to allow the bat to emerge during the evening. Once empty, the box/es will be stored in a dry place until they can be re-positioned in the original location on completion of works – new boxes will be provided to replace any that have deteriorated beyond suitability for use by bats.

Once the bat boxes and timbers have been removed, the building works can proceed without supervision. No bat roosts were recorded within the roof of B8; however it is recommended that a toolbox talk be provided to inform contractors as to the procedure to be followed should bats be found during the roofing works.

Compensation - Roost replacement

B3 – The roosting requirements of Nathusius’ pipistrelle are not well understood and it is therefore recommended that the existing feature is re-instated post-renovation of the building by installing artificially ‘lifted’ timbers at the same height, location and elevation. It is recommended that, where appropriate, undamaged timbers from the existing feature are used during the re-instatement of the roost.

B8 – Soprano pipistrelle is known to use both crevice and hollow type boxes as summer roosts. It is recommended that one crevice-type and one hollow-type box are installed on suitable trees in an undisturbed area in close vicinity to the building. The boxes will be placed at varying height and aspect to provide a range of conditions. The new boxes should be put in place at least 4 weeks prior to the temporary removal of the existing boxes.

B8 - Daubenton’s use hollow-type boxes; locating a box to create the specific conditions required for hibernation is difficult and it is recommended that two different box types are located on a nearby tree or trees at varying height and aspect to provide a range of conditions. The boxes should be put in place at least 4 weeks prior to the start of works to remove the roosts.

Once building works have been completed, it is recommended that the existing or replacement boxes are re-installed at the original locations on the southern and western elevations of the newly renovated building. In addition, new boxes comprising two crevice-type and two hollow-type should also be installed in suitable locations on the southern and western elevations.

Monitoring

Within the Bat Mitigation Guidelines there are no post-development monitoring requirements for small non-maternity day roosts of common species. However, due to the presence of the Nathusius’ pipistrelle roost and the potential cumulative impact of the loss and/or disturbance of day and hibernation roosts within the survey area, it is recommended that monitoring is undertaken of all roost compensation measures (Mitchell-Jones, 2004).

There is a lack of long term monitoring data for bat mitigation work (Paul Lintott & Fiona Mathews, 2018) and given the conservation interest of the reserve it is recommended that monitoring is carried out over the long term. The monitoring surveys should start on completion of works and be carried out during alternate years over a ten year period (i.e. five survey years in total). The methodology for surveys should include both presence/likely absence dusk emergence surveys and endoscope checks, and can be carried out in

collaboration with reserve staff and/or volunteers. Any remediation measures required to the bat boxes or roost feature would require oversight by a licensed ecologist or accredited agent.

Conservation status of bats

The mitigation and compensation measures aim to ensure that the conservation status of the bat population within the survey area remains the same or preferably improved post-development, and that the population can function as before. Appropriate long-term habitat management and maintenance will be required to ensure that the bat population can persist.

7.2 Outline mitigation strategy – trees

One tree T184 has low suitability features for roosting bats and will be felled as part of the proposals. The tree will need to be soft-felled under the supervision of a licensed ecologist or accredited agent; works should be undertaken during May-September. Should a bat be discovered during felling, it will be taken into care and released at the same location during the evening of the same day, and consultation with Natural England will be required.

7.3 Outline mitigation strategy – foraging habitat

Foraging activity by seven species was recorded throughout the survey area. It is understood that the proposals include only limited removal of trees and scrub, with minimal impact on the tree corridors that are present within the north, west and south of the survey area. To compensate for the proposed removal of native and non-native scrub and trees within the east of the survey area, the proposals include new areas of native shrub and tree planting of species which already occur within the reserve. These measures will provide additional foraging and commuting habitat for bats.

7.4 Sensitive lighting strategy

Hedges and treelines are used by bats to navigate between roosts and feeding areas and the continuity of such features is important to maintain the conservation status of bat populations. Whilst foraging and commuting, most bats tend to fly close to such linear features or close to a tree canopy, so the presence of protected flight routes around roosts is important (Mitchell-Jones, 2004). As lighting is known to have significant impacts on bat foraging and roosting behaviour, a Sensitive Lighting Plan for bats will need to be agreed, to include measures detailed in Guidance Note 08/18 – ‘Bats and artificial lighting in the UK’ (Bat Conservation Trust and the Institute of Lighting Professionals, 2018). This guidance includes the use of low intensity, low set (e.g. bollards) and downward projecting lighting, with passive infrared motion sensor lighting to minimise the duration of the lit period. The following factors should also be considered:

- Avoid excessive lighting, use only the minimum amount of light needed for safety;
- Minimise light spill, eliminate any bare bulbs and any upward pointing light;
- The spread of light should be kept near to or below the horizontal, e.g. by using flat cut-off lanterns;
- Use narrow spectrum bulbs to lower the range of species affected by lighting;
- Lights should peak higher than 550nm or have glass lantern covers to filter UV light. White LED lights do not emit UV but have still been shown to disturb slow-flying bat species;
- Increase the spacing of lanterns;

- Avoid using reflective surfaces under lights;
- Many bat species show a clear preference for avoiding well-lit areas and shaded flight paths between roosting areas and surrounding foraging areas should be retained.

The following specific mitigation measures are also recommended:

- Avoid any impacts of artificial lighting on known (or high likelihood) roost locations within and immediately adjacent to the survey area, to include B3, B6 and T27.
- Avoid any increase in the impacts of artificial lighting on retained tree and scrub vegetation within the survey area and the adjacent tree line, woodland and lake habitats of the wider reserve. This includes any trees identified as having suitable features for roosting bats.
- Avoid any impact of artificial lighting on new areas of soft-landscaping which are likely to be of value to foraging and commuting bats - such as scrub, tree-lines and hedgerows, and on any newly installed artificial roosts (bat boxes, lifted tiles etc.).
- Where evening activities are to be carried out within the renovated visitor centre B8, black-out curtains and blinds should be used to ensure no increase in artificial lighting impacts on the adjacent tree lines, existing and proposed bat boxes, and the building B6.
- A security alarm box which produces a constant white light is currently located on the eastern elevation of B6. It is recommended that when the building security system is upgraded as part of the building works, this should be repositioned as the light currently impacts on a potential access hole into the roof void.

7.5 Use of roofing membranes within new structures / roofing

Within any new or renovated roof areas, non-bitumen / breathable roofing membranes with polypropylene filaments (also called non-woven textiles) should be avoided wherever possible due to the risk of roosting bats becoming entangled in the filaments; Natural England recommend the use of 1F roofing felt with a hessian matrix instead.

7.6 Mitigation for other species - nesting birds

Suitable features for nesting birds were noted within several buildings. Under the Wildlife and Countryside Act (1981) as amended, all breeding birds, including eggs and chicks, are protected against injury or killing and their nests are protected against damage or destruction up until the eggs have hatched and the chicks have fledged. Each building to be removed or renovated should be checked for any signs of nesting birds in advance of works – species such as pigeon are known to nest within buildings throughout the year. If an active nest is found then works will be delayed until all chicks have fledged and the nests are no longer in use.

8 ECOLOGICAL ENHANCEMENTS

In addition to the above measures, ecological enhancements should where possible be incorporated into the proposed development to contribute towards the objectives of planning legislation. In July 2018, the UK Government published the revised National Planning Policy Framework (NPPF) which states that “opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity” (Para 175).

Enhancement recommendations for a range of habitats and species were provided within the PEA report. The following enhancements pertain specifically to bats:

- Common and soprano pipistrelle and serotine were recorded within the survey area. Where possible it is recommended that the renovated visitor centre incorporates integral roosting features for these species – for example bat bricks and tubes, and artificially ‘lifted’ roof tiles and timber cladding
- Where suitable opportunities occur within the survey area or wider reserve, the veteranisation of trees to provide roosting features for bats is recommended
- Explore opportunities to create a bat hibernation feature within a disused structure associated with the gravel workings in the wider reserve.

9 REFERENCES

- Altringham, J.D. 2003. *British Bats*. The New Naturalist Library.
- Andrews H. & Pearson L., 2016. A review of empirical data in respect of emergence and return times reported for the UK's 17 native bat species. Bridgewater: AEcol.
- Bat Conservation Trust. 2016. Core Sustainance Zones: Determining Zone Size.
- Bat Conservation Trust and the Institute of Lighting Professionals, 2018. Guidance Note 08/18 – 'Bats and artificial lighting in the UK'
- Collins J (ed.), 2016. *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edition) Bat Conservation Trust, London
- Dietz, C., von Helversen, O. and Nill, D. (2009) *Bats of Britain, Europe and Northwest Africa*. A & C Black.
- JNCC (Joint Nature Conservation Committee) 2004. *The Bat Workers Handbook*. JNCC, Peterborough.
- Kent Bat Group, 2018. UK and Kent bats distribution table 2018. After UK Mammals: Species Status and Population Trends (Jessamy Battersby, 2005) and Mammals of Kent Atlas 2001 - 2012. <http://www.kentbatgroup.org.uk/bats-in-kent/>
- Lintot, P. and Mathews, F. (2018) Reviewing the evidence on mitigation strategies for bats in buildings: informing best-practice for policy makers and practitioners. CIEEM.
- Mathews F. et al. (2018) A Review of the Population and Conservation Status of British Mammals: Technical Summary. A report by the Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage. Natural England, Peterborough.
- Mitchell-Jones, A.J. (ed.), 2004. *Bat mitigation guidelines*. English Nature, Peterborough.
- Natural England. 2016. MAGIC website. Available from: <http://magic.defra.gov.uk/>. December 2016.

Appendix 1. Annotated photographs



B1 – Derelict brick and concrete structure without roof, windows and doors



B1 – Plywood attached to concrete walls



B2 - Timber framed outbuilding with corrugated metal roof and walls with open-sided extension



B2 - open-sided extension showing timber beams



B2 Internal view



B3 Internal view



B3 – Single storey building with weatherboard cladding



B3 - Gaps behind timbers on western elevation



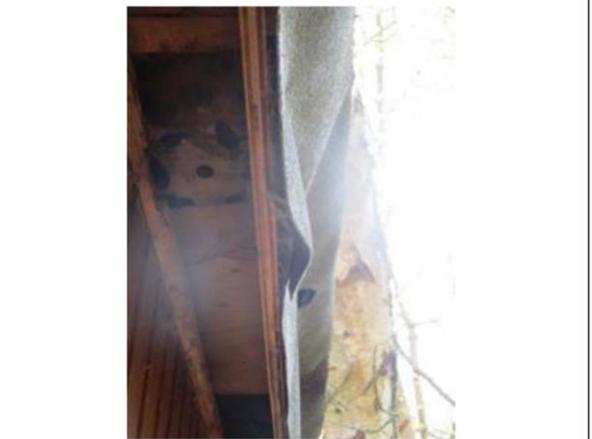
B4 - Metal container structures



B5 - Timber structure showing overhanging felt



B5 - Crevice in timber soffit box



B5 - Lifted roofing felt on western elevation

	
<p>B6 Brick built structure with wooden tile clad walls</p>	<p>B6 Hole in tile on western elevation at c. 2.5m height.</p>
	
<p>B6 Hole at the end of the timber soffit on north-western corner of building</p>	<p>B6 Lifted roof and ridge tiles on southern elevation</p>
	
<p>B6 – Dark classroom interior</p>	<p>B6 – Trussed roof showing underside of wooden roof tiles</p>

	
<p>B8 – Southern and eastern elevation – bat box on SE corner where pipistrelle roost was recorded</p>	<p>B8 – Bat boxes on southern elevation where pipistrelle bat roost was recorded</p>
	
<p>B8 – Lifted timbers typical of southern and western elevations</p>	<p>B8 – Trussed roof of porch on southern and eastern elevation</p>
	
<p>B8 – Western elevation with dense elder growth</p>	<p>B8 – Bat box on western elevation together with lifted timbers</p>

	
<p>B8 – Interior showing sky lights and vaulted ceiling</p>	<p>B8 – Damaged ceiling tiles with potential access from space beneath roof tiles</p>
	
<p>B8 Outbuilding – small shed adjacent to western elevation</p>	<p>B8 Outbuilding – woodstore adjacent to northern elevation</p>
	
<p>Woodstore – double skin roof of corrugated rubber sheeting</p>	<p>B8 Outbuilding – Containers adjacent to the northern elevation</p>

	
<p>T4 – Crevices between adjacent stems at low height. Low potential.</p>	<p>T10 – Standing dead wood on eastern shoreline of West lake. Hollow with holes on NW elevation. Moderate bat potential.</p>
	
<p>T13 - Feature at 4m on southern elevation with Low potential.</p>	<p>T14 - Mature oak showing example of lifted bark. Low potential.</p>
	
<p>T17 - Decaying potentially hollow silver birch with numerous features. Moderate potential.</p>	<p>T27- showing lightning strike on western aspect</p>

Appendix 2. Results of mitochondrial DNA analysis of bat droppings



25 November 20

Re: Identification Results for Clair Thackray, Kent Wildlife Trust Consultancy Services

Job number 16131, received 12 November 2020

Sample labelled: KWT CS/Sevenoaks B6_B

PCR amplification successful. DNA sequence:

ATGACCAACATTCGAAAGTCCCATCCCCTAATCAAATTATTAACAGCTCATTTCATTG
ACCTACCAGCTCCATCAAACATCTCAGCATGATGGAATTTTGGATCCCTATTAGGC

Phylogenetic analysis identification: *Pipistrellus pygmaeus*

Confirmed by maximum likelihood, maximum parsimony, bootstrap 100%.

Best regards,

Professor Robin Allaby

The results and conclusions in this report are based on an investigation of mtDNA sequence analysis. The results obtained have been reported with accuracy. The interpretation represents the most probable conclusion for the DNA sequence obtained rather than the sample provided given current levels of species data. It should be borne in mind that different circumstances might produce different results. Therefore, care must be taken with interpretation of the results especially if they are used as the basis for commercial recommendations.

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25 November 20

Re: Identification Results for Clair Thackray, Kent Wildlife Trust Consultancy Services

Job number 16132, received 12 November 2020

Sample labelled: KWT CS/Sevenoaks B8

PCR amplification successful. DNA sequence:

```
ATGACAAACATTCGAAAGTCCCATCCCCTAATCAAATTATTAACAGCTCATTATTG
ACCTACCAGCTCCATCAAACATCTCAGCATGATGGAATTTGGATCCCTATTAGGCAT
CTGTCTAGGGCT
```

Phylogenetic analysis identification: *Pipistrellus pygmaeus*

Confirmed by maximum likelihood, maximum parsimony, bootstrap 100%.

Best regards,

Professor Robin Allaby

The results and conclusions in this report are based on an investigation of mtDNA sequence analysis. The results obtained have been reported with accuracy. The interpretation represents the most probable conclusion for the DNA sequence obtained rather than the sample provided given current levels of species data. It should be borne in mind that different circumstances might produce different results. Therefore, care must be taken with interpretation of the results especially if they are used as the basis for commercial recommendations.

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Appendix 3. Presence/likely absence survey data

Table 3.1 Summary data for the presence/likely absence survey of building B2

Building	Survey No.	Emergence / Return to roost	Time of record	Surveyor no.	Species	Notes
B2	1	None	21.07	S1	Noctule and soprano pipistrelle	HnS
			21.17	S1	Common pipistrelle	HnS
			21.18 - 36	S1	Soprano pipistrelle	HnS, 9 passes
			21.32-33	S1	Common pipistrelle	HnS, 2 passes
			21.37	S2	Noctule	HnS
			21.37 - 45	S2	Soprano pipistrelle	HnS 16 passes, at least 2 bats
			21.44	S1	Noctule	HnS
			21.45	S2	Common pipistrelle and Noctule	HnS, 2 passes
			21.45	S1	Leisler	HnS
			21.51 -56	S1	Common and Soprano pipistrelle	HnS, several passes each
			21.58-22.01	S1	Daubenton	HnS, 3 passes
			22.01-07	S2	Common pipistrelle	HnS, 2 bats, 6 passes
			22.01-25	S1	Soprano pipistrelle	HnS, c.20 passes
			22.08	S1	Noctule	HnS
			22.15	S1	Common pipistrelle	HnS, pass
			22.27 - 37	S2	Soprano pipistrelle	Circling/foraging N to S

* Heard not seen = HnS; Seen not heard = SnH; Seen and heard = S+H.

Table 3.2 Summary data for the presence/likely absence survey of building B3

Building	Survey No.	Emergence / Return to roost	Time of record	Surveyor	Species	Notes*
B3	1	Emergence	20.25	S2	Nathusius pipistrelle	Emergence of one bat from western elevation
			20.26	S2	Noctule	HnS single pass
			20.26 - 39	S2	Soprano and common pipistrelle	c.20 passes, foraging over B3, bare ground and edge of woodland
			20.40 - 57	S2	Serotine	Two bats continuously foraging over trees and bare ground area
			20.47	S2	Noctule	Pass, HnS
			20.50 - 55	S2	Common pipistrelle	Foraging over B3, bare ground and edge of woodland, several passes
			21.00	S2	Noctule	H+S
			21.05	S2	Common pipistrelle	H+S
B3	2	None	21.11	S3	<i>Myotis</i>	Pass, SnH
			21.13 - 21	S1 + S3	Common and soprano pipistrelle	Several HnS foraging passes
			21.21	S1	Nathusius pipistrelle	HnS
			21.21	S2	Noctule	Pass, HnS
			21.22 -	S3	Soprano pipistrelle	Pass, HnS
			21.23	S2	Nathusius pipistrelle	HnS
			21.23	S1 + S3	Soprano pipistrelle	Two bats, pass N to W
			21.24	S2	Noctule	Pass, HnS
			21.24	S3	<i>Myotis</i> sp.	Pass N to W

Building	Survey No.	Emergence / Return to roost	Time of record	Surveyor	Species	Notes*
			21.24 - 34	S1, S2 + S3	Common and soprano pipistrelle	Continuous passes by several bats
			21.29	S3	Daubenton's	Pass, S+H
			21.30	S3	Common pipistrelle	Pass, 3 bats
			21.31 - 36	S1 + S2	Common and soprano pipistrelle	Continuous passes
			21.32	S3	<i>Myotis</i> sp.	HnS
			21.34	S3	Noctule	HnS
			21.37	S1	Noctule	Pass, HnS
			21.36	S3	<i>Myotis</i> sp.	S+H
			21.36 – 22.26	S1, S2 + S3	Common and soprano pipistrelle	4 bats continuous circling/foraging with social calls
			21.39 - 41	S3	Daubenton's	S+H, 2 bats foraging
			21.49	S2	<i>Myotis</i> sp.	HnS
			21.52	S2	Noctule	HnS
			21.58	S1	<i>Myotis</i> sp.	HnS
			22.07	S3	Noctule	HnS
			22.11-13	S2+S3	<i>Myotis</i> sp.	HnS

Table 3.3 Summary data for the presence/likely absence surveys of building B5

Building	Survey No.	Emergence / Return to roost	Time of record	Surveyor no.	Species	Notes
B5	1	None	20.52	S1	Soprano pipistrelle	HnS
			20.59	S1	Noctule	HnS
			21.01 – 22.19	S1 / S2	Soprano pipistrelle	HnS / S+H continual passes (>60)
			21.06-08	S2	Noctule	HnS, 3 passes
			21.16-18	S1+S2	Noctule	HnS / H+S, 3 passes
			21.22	S1	Serotine	H+S
			21.27	S2	Soprano pipistrelle	H+S, 2 bats
			21.31	S2	Noctule	HnS
			21.30 – 22.10	S2	Common pipistrelle	HnS / S+H, Foraging over trees >40 passes
			21.35	S1	Serotine	HnS
			21.36	S2	Brown long-eared	HnS
			21.41	S1	<i>Myotis</i> sp.	2 passes, HnS
			21.46	S1	Nathusius pipistrelle	1 pass, HnS
			21.46	S1	Noctule	HnS
			22.00	S1	<i>Myotis</i> sp.	HnS

Table 3.4 Summary data for the presence/likely absence survey of building B6

Building	Survey No.	Emergence / Return to roost	Time of record	Surveyor No.	Species	Notes*
B6	1	Yes – see below	21.18	S3	Soprano pipistrelle	Pass W to E along building
			21.20	S2	Soprano pipistrelle	Pass, north of building
			21.23	S1	Pipistrelle sp.	HnS
			21.32	S3	Soprano pipistrelle	H+S, foraging
			21.36	S3	Common pipistrelle	H+S, foraging
			21.33	S2	Soprano pipistrelle	Pass H+S
			21.39-21.52	S3	Soprano pipistrelle	H+S, foraging, several passes
		Emergence	21.52	S1	Common pipistrelle	Emerged from beneath roof tile near ridge on eastern end of southern elevation, SnH
			21.58	S2+S3	Common pipistrelle	HnS
			22.00-01	S1-S3	Soprano pipistrelle	HnS
			22.02	S3	BLE	HnS
			22.05-7	S2, S3	Soprano pipistrelle	H+S pass
			22.07-09	S2+S3	Noctule	HnS, 2 passes
			22.12	S3	BLE	HnS
			22.17	S3	Soprano pipistrelle	H+S
			22.21	S3	Common pipistrelle	HnS

Building	Survey No.	Emergence / Return to roost	Time of record	Surveyor No.	Species	Notes*
B6	2		21.03	S2+S3	Soprano pipistrelle	Two passes
			21.08	S3	Noctule	HnS
			21.15	S3	Soprano pipistrelle	HnS
			21.17- 48	S3 + S1	Noctule	HnS, continuous passes
			21.19- 22.26	S3 / S1	Soprano pipistrelle	HnS / H+S, continuous passes
		Emergence	21.33	S2 + S1	Soprano pipistrelle	Emergence from beneath a hanging tile near the eaves on the eastern gable end, flew south around building to S1
			21.44	S3	Leisler	HnS
			21.45- 22.26	S3	Common pipistrelle	HnS, frequent passes
			21.53 - 22.25	S3	Daubenton's	HnS, 3 passes
			22.07	S3	Leisler	HnS
	22.08- 22.10	S3	<i>Nyctalus</i> sp.	HnS		

Table 3.5 Summary data for the presence/likely absence survey of tree T27

Tree No.	Survey No.	Emergence / Return to roost	Time of record	Surveyor No.	Species	Notes*
T27	1	None	21.43	S4	Soprano pipistrelle	Pass over tree from W to E
			21.58	S4	Common pipistrelle	Circling over building B6

Table 3.6 Summary data for the presence/likely absence survey of building B8

Building	Survey No.	Emergence / Return to roost	Time of record	Surveyor	Species	Notes*
B8	1	Emergence	21.19	S2	Soprano pipistrelle	Emerged from westernmost bat box on southern gable end
			21.36	S1	Noctule	HnS
			21.39 – 22.48	All	Soprano pipistrelle	HnS, >30 passes, majority recorded by S1-3. Social calling and foraging.>1 bat.
			21.56 – 22.48	All	Common pipistrelle	HnS / H+S, >25 passes, majority recorded by S1-3. Social calling and foraging. >1 bat.
			22.01	S1, S2, S3	<i>Nyctalus</i> or serotine	HnS
		Emergence	22.02	S1	Soprano pipistrelle	Emerged from small bat box on eastern elevation
			22.06	S1	<i>Myotis</i> sp.	HnS
			22.26	S1	<i>Myotis</i> sp.	HnS
			22.36	S1	Common pipistrelle	HnS
B8	2	None	04.05 – 05.02	S1, S3 + S4	Soprano pipistrelle	HnS, > 80 passes, >1 bat with social calling
			04.03- 25	S1 + S4	Common pipistrelle	HnS, low number of passes
			04.29	S1	<i>Myotis</i> sp.	Pass, HnS
			04.30 – 5.18	S1 + S3 + S4	Soprano and common pipistrelle	HnS, continuous foraging by soprano pipistrelle with occasional common pipistrelle
			05.05	S1 + S4	Noctule	HnS
			05.21	S4	<i>Myotis</i> sp.	HnS